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09/745,301	12/22/2000	Anand Kannan	05245.00001	6994

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EXAMINER	
BAYARD, EMMANUEL	
ART UNIT	**PAPER NUMBER**
2631	7

DATE MAILED: 07/12/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/745,301	KANNAN ET AL.	
	Examiner	Art Unit	
	Emmanuel Bayard	2631	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 December 2000*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-33* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-33* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *4-6*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-11 are rejected under 35 U.S.C. 102(e) as being anticipated by Polley e al U.S. patent No 6,618,480.

As per claim 1, Polley et al discloses a method for error reduction in a communication system comprising a plurality of communication devices and a plurality of orthogonal sub carriers, the method comprising steps of: determining, by a first communication device (see fig.1 element 10) of the plurality of communication devices, an equalization function that reduces a multipath delay of the received signal (see fig.5 element 48 and col.3, lines 25-35 and col.4, lines 15-25); receiving, by a second communication device (see fig.1 element 12 [18]) of the plurality of communication devices, sub carrier suppression information; suppressing (see col., lines 47-67 and col.3, lines 25-35), by the second communication device, an orthogonal sub carrier of the plurality of orthogonal sub carriers based on the received sub carrier suppression information to produce a suppressed sub carrier and a non-suppressed sub carrier (see fig.5 and col.4, lines 11-45); transmitting, by the second communication device (see fig.1 element 12 [16]), a signal comprising at least the non suppressed sub carrier to produce a transmitted signal; receiving, by the first communication device (see fig.1 element 10 [18]), the transmitted signal to produce a

received signal; and processing (see fig.5 element 44), by the first communication device (see fig.1 element 10), the received signal based on the determined equalization function.

As per claims 2, 3, 5, Polley et al disclose measuring the power ratio of echo path (see col.2, lines 35-67). Therefore the steps of determining, by the first communication device, a signal quality metric for each sub carrier of the plurality of orthogonal sub carriers to produce a plurality of signal quality metrics; transmitting, by the first communication device, sub carrier suppression information based on the plurality of signal quality metrics; and wherein the sub carrier suppression information received by the second communication device comprises the sub carrier suppression information transmitted by the first communication device is inherently taught by Polley. .

As per claim 4, Polley inherently teaches a step of comparing at least one determined signal quality metric to a signal quality metric threshold to produce a comparison, and wherein the step of suppressing a sub carrier comprises a step of suppressing an information bearing sub carrier of the plurality of information bearing sub carriers based on the comparison order to produce at least one suppressed sub carrier and at least one non-suppressed sub carrier.

As per claim 6, Polley inherently teaches the step of determining an equalization function comprises steps of: determining a channel transfer function; determining a desired composite communication channel transfer function; determining an equalization function based on the determined channel transfer function and the desired composite communication channel transfer function, wherein the equalization function reduces the multipath delay of the received signal when the multipath delay of the received signal exceeds a tolerable multipath delay.

As per claim 7, Polley inherently teaches a convolution of the equalization function with the estimated channel transfer function produces a desired composite communication channel transfer function that comprises the tolerable multipath delay.

As per claim 8, Polley inherently teaches the determined channel transfer function comprises a greater multipath delay than the tolerable multipath delay of the desired composite communication channel transfer function, and wherein the equalization function reduces a multipath delay of a received signal.

As per claim 9, Polley inherently teaches the first communication device comprises a plurality of antennas, wherein the step of determining an equalization function comprises a step of determining, by a first communication device of the plurality of communication devices, a plurality of equalization functions that together reduce a multipath delay of the transmitted signal, wherein the step of receiving comprises a step of receiving, by the first communication device, the transmitted signal via each antenna of a plurality of antennas to produce a plurality of received signals, and wherein the step of processing comprises a step of processing, by the first communication device, each received signal of the plurality of received signals based on a determined equalization function of the plurality of determined equalization functions.

As per claim 10, Polley inherently teaches the step of determining a plurality of equalization function comprises steps of: determining a plurality of composite equalization functions, wherein each composite equalization function of the plurality of composite equalization functions comprises a plurality of equalization functions that together reduce a multipath delay of the transmitted signal; determining an optimal composite equalization function from among the plurality of composite equalization functions; and determining a

plurality of equalization functions based on the determination of an optimal composite equalization function.

As per claim 11, Polley inherently teaches the step of determining an optimal composite equalization function comprises steps of: for each composite equalization function of the plurality of composite equalization functions, determining a signal-to-noise ratio (SNR) for at least one sub carrier of a signal received by the first communication device to produce determined Sir's; for each composite equalization function of the plurality of composite equalization functions, determining a minimum SNR from among the determined Sir's; determining a maximum SNR from among the minimum Sir's determined for each composite equalization function of the plurality of composite equalization functions to produce a determined maximum SNR; and determining an optimal composite equalization function based on the composite equalization function corresponding to the determined maximum SNR.

3. Claims 12-15 are rejected under 35 U.S.C. 102(e) as being anticipated by Frodigh et al U.S. patent No 5,726,978.

As per claim 12, Frodigh et al discloses a method for error reduction in a communication system comprising a plurality of orthogonal sub carriers, the method comprising steps of: determining a signal quality metric for each orthogonal sub carrier of the plurality of orthogonal sub carriers to produce a plurality of signal quality metrics (see abstract and col.4, lines 57-67 and col.5, lines 12-25 and col.8, lines 59-63 and col.16, lines 27-45); and suppressing an orthogonal sub carrier of the plurality of orthogonal sub carriers based on a signal quality metric of the plurality of signal quality metrics (see col.2, lines 43-45, 58-60 and col.3, lines 25-27 and col.12, lines 18-50 and col.18, lines 23-29).

As per claim 13, Frodigh et al inherently includes the step of suppressing an orthogonal sub carrier comprises steps of: determining an order of the plurality of orthogonal sub carriers; and suppressing an orthogonal sub carrier of the plurality of orthogonal sub carriers based on the determined order.

As per claim 14, Frodigh et al inherently includes the step of suppressing an orthogonal sub carrier comprises steps of: comparing at least one signal quality metric of the plurality of signal quality metrics to a signal quality metric threshold to produce a comparison; and suppressing an orthogonal sub carrier of the plurality of orthogonal sub carriers based on the comparison.

As per claim 15, Frodigh et al inherently includes the communication system further comprises a transmitting communication device that transmits user information and a receiving communication device that receives user information, wherein the step of determining a signal quality metric is performed by the receiving communication device, and wherein the step of suppressing a sub carrier is performed by the transmitting communication device.

4. Claims 16-XXx are rejected under 35 U.S.C. 102 (e) as being anticipated by Polley et al U.S. Patent No 6,618,480 B1.

As per claim 16, Polley et al discloses a method for error reduction in an orthogonal modulation communication system comprising steps of: determining an equalization function that is capable of reducing a multipafh delay of a received signal that comprises a plurality of orthogonal sub carriers (see fig.5 element 48 and col.3, lines 25-35 and col.4, lines 1-45); and reducing a delay of the received signal based on the computed equalization function (see fig.5 element 48 and col.3, lines 25-35 and col.4, lines 1-45).

As per claim 17, Polley et al inherently includes the step of determining an equalization function comprises steps of: determining a channel transfer function; determining a desired composite communication channel transfer function; and determining an equalization function that is based on the determined channel transfer function and the desired composite communication channel transfer function and that reduces a multipath delay of a received signal.

As per claim 18, Polley et al inherently includes a convolution of the equalization function with the estimated channel transfer function produces a desired composite communication channel transfer function that comprises a tolerable multipath delay.

As per claim 19, Polley et al inherently includes the determined channel transfer function comprises a greater multipath delay than the tolerable multipath delay of the desired composite communication channel transfer function.

As per claim 20, Polley et al inherently includes the step of determining an equalization function comprises a step of determining a plurality of equalization functions that are based on the determined channel transfer function and the desired composite communication channel transfer function that together reduce a multipath delay of the received signal.

As per claim 21, Polley et al inherently includes the step of determining a plurality of equalization functions comprises steps of: determining a plurality of composite equalization functions, wherein each composite equalization function of the plurality of composite equalization functions comprises a plurality of equalization functions that together reduce a multipath delay of the received signal; determining an optimal composite equalization function

from among the plurality of composite equalization functions; and determining a plurality of equalization functions based on the determination of an optimal composite equalization function.

As per claim 22, Polley et al inherently includes the step of determining an optimal composite equalization function comprises steps of: for each composite equalization function of the plurality of composite equalization functions, determining a signal-to-noise ratio (SNR) for at least one sub carrier of an orthogonal frequency division multiplex signal to produce determined SNR's; for each composite equalization function of the plurality of composite equalization functions, determining a minimum SNR from among the determined SNR's; determining a maximum SNR from among the minimum Sir's determined for each composite equalization function of the plurality of composite equalization functions to produce a determined maximum SNR; and determining an optimal composite equalization function based on the composite equalization function corresponding to the determined maximum SNR.

5. Claims 23-33 are rejected under 35 U.S.C. 102(e) as being anticipated by Frodigh et al U.S. Patent No 5,726,978.

As per claims 23, 26, 28 Frodigh et al discloses a communication device comprising: a receiver that receives a signal that comprises a plurality of orthogonal subcarriers (see figs 3a, 3c element 330 and col.4, lines 30-50 and col.8, lines 38-44); a signal processing unit coupled to the receiver that receives the plurality of orthogonal subcarriers from the receiver (see fig. 3a element 360), determines a signal quality metric for each subcarrier of the plurality of orthogonal subcarriers, and determines subcarrier suppression information based on the determined signal quality metrics (see abstract and col.4, lines 50-67 and col.8, lines 59-63 and col.16, lines 27-30); and a transmitter (see fig.3a element 300) coupled to the signal processing unit that receives the

subcarrier suppression information from the signal processing unit and transmits the received subcarrier suppression information.

As per claim 24, Frodigh does teach the subcarrier suppression information comprises the determined signal quality metrics (see col.8, lines 59-63).

As per claim 25 Frodigh et al inherently includes a memory associated with the signal processing unit that stores a signal quality metric threshold, wherein the signal processing unit further retrieves the signal quality metric threshold from the memory and compares at least one determined signal quality metric to the signal quality metric threshold to produce a comparison, and wherein the subcarrier suppression information comprises the comparison.

As per claim 27, Frodigh et al inherently includes the signal processing unit modulates the data onto each orthogonal subcarrier of the plurality of orthogonal subcarriers prior to suppressing the at least one orthogonal subcarrier.

As per claim 29, Frodigh et al inherently includes the determination of an equalization function by the signal processing unit comprises determining a desired composite communication channel transfer function and determining an equalization function based on the communication channel transfer function and the desired composite communication channel transfer function.

As per claim 30, Frodigh et al inherently includes the signal comprising a plurality of orthogonal subcarriers comprises a first signal, wherein the receiver further receives a second signal comprising a plurality of orthogonal subcarriers, wherein the signal processing unit determines subcarrier suppression information based on the plurality of orthogonal subcarriers included in the first signal and conveys the determined subcarrier suppression information to a

transmitter coupled to the signal processing unit, and wherein the transmitter transmits the subcarrier suppression information.

As per claim 31, Frodigh et al inherently includes wherein the communication device further comprises a plurality of antennas, wherein the reception by the receiver of a signal comprises receiving a transmitted signal via each antenna of the plurality of antennas to produce a plurality of received signals, wherein the transmitted signal comprises a plurality of orthogonal subcarriers, wherein a determination of an equalization function by the signal processing unit comprises a determination of a plurality of equalization functions based on a determination of at least one communication channel transfer function, wherein the plurality of equalization functions together reduce a multipath delay of the transmitted signal when the multipath delay exceeds a tolerable multipath delay, and wherein a processing of the signal by the signal processing unit comprises processing each received signal based on a determined equalization function of the plurality of determined equalization functions.

As per claim 32, Frodigh et al inherently includes the determination of a plurality of equalization functions comprises determining a plurality of composite equalization functions, wherein each composite equalization function of the plurality of composite equalization functions comprises a plurality of equalization functions that together reduce a multipath delay of the transmitted signal, determining an optimal composite equalization function from among the plurality of composite equalization functions, and determining a plurality of equalization functions based on the determination of an optimal composite equalization function.

As per claim 33, Frodigh et al inherently includes the determination of an optimal composite equalization function comprises determining, for each composite equalization

function of the plurality of composite equalization functions, a signal-to-noise ratio (SNR) for at least one subcarrier of a signal received by the communication device to produce determined Sir's, determining, for each composite equalization function of the plurality of composite equalization functions, a minimum SNR from among the determined Sir's, determining a maximum SNR from among the minimum Sir's determined for each composite equalization function of the plurality of composite equalization functions to produce a determined maximum SNR, and determining an optimal composite equalization function based on the composite equalization function corresponding to the determined maximum SNR.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Jou U.S. Patent No 6,466,606 B1 teaches a method and apparatus for performing search acquisition in a multi-carrier communication system.

Wu U.S. Patent No 6,072,782 teaches an efficient echo cancellation for DMT MDSL.

Baum et al U.S. Patent No 5,867,478 teaches a synchronous coherent orthogonal frequency division multiplexing.

Hamdi U.S. Patent NO 6,567,464 B2 teaches a fast retrain based on communication profiles for a digital modem.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Emmanuel Bayard whose telephone number is 703 308-9573. The examiner can normally be reached on Monday-Friday (7:Am-4:30PM) Alternate Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mohammed Ghayour can be reached on 703 306-3034. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Emmanuel Bayard
Primary Examiner
Art Unit 2631

7/6/04

EMMANUEL BAYARD
PRIMARY EXAMINER